

# **Requirements for fire detectors mounted engine rooms of heavy vehicles**

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*This article addresses a theoretical study that has been conducted at SP Fire Research, where an attempt has been made to identify which physical phenomena that arise in engine rooms of heavy vehicles that may jeopardize the durability of fire detectors mounted in that type of environment. The research shows promise as appropriate test methods along with suitable durability requirements that address these phenomena have been developed.*

## **Introduction**

As of today, there are standardized certifications regarding the fire suppression system in heavy vehicles but test methods and requirements for fire detection systems have not yet been implemented. A stepping stone in the right direction of creating a standard for fire detection systems is by first looking at the durability requirements for fire detectors that are to be mounted in heavy vehicles. In order to accomplish this, the investigation is specified to the engine compartment of heavy vehicles and deeper knowledge regarding which aspects that influence the failure of detectors is studied. The research has revealed which of the physical phenomena arising in engine rooms that have the highest impact on the fire detector's durability and functionality.

## **The physical phenomena that have been identified**

The amount of physical phenomena arising in the engine compartments of heavy vehicles differs depending on what type of vehicle it is, its operating principles and its operating environment. However, it was found that six general phenomena, regardless of vehicle type, are recurring in engine compartments of heavy vehicles. These are: corrosion, ageing, heat, random vibrations and mechanical shocks, electric and electromagnetic disturbances and finally the impact of dust, dirt and water, commonly known as IP-classification.

## **Test methods addressing the phenomena**

In order to eventually establish fitting durability requirements for fire detectors in engine rooms, the fire detectors need to be tested in a manner that address the physical phenomena that affect the fire detectors' durability and functionality. There are many applicable test methods but those that were selected in this study are tests that are already used as standards in the automotive industry but with minor modifications in some cases. Although mostly adopted for electronic devices, the test methods are very flexible in the way that they are conducted, which is why they were deemed applicable to all types of fire detectors as well. A generalization of the test parameters has been made in order for them to be valid for all types of heavy vehicles. This is why most of them are set in intervals.

## **Recommended durability requirements**

The recommended durability requirements in this study are based on the recommended test methods and test parameters, consultations with representatives from heavy vehicle manufacturers and expertise advice from people at SP Technical Research Institute of Sweden. If the fire detectors pass the requirements for the tests, they should be suited for mounting in any engine compartment of any heavy vehicle type without its functionality or lifespan being reduced due to the physical phenomena arising in that environment. However, as much as it is believed that fire detectors will pass the test in theory, no practical experiments have been conducted in this study. It is therefore vital to actually perform the tests with regard to the test parameters in order to discover if they are in fact applicable and if the fire detectors will pass the requirements or not.

*By Vedran Kovacevic*

*Lund University, Faculty of Engineering*

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